



# UNITED STATES PATENT AND TRADEMARK OFFICE

faw

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/839,485	04/20/2001	Bruce S. Lavoie	KHEN-P01-001	2615
28120	7590	12/23/2005	EXAMINER	
FISH & NEAVE IP GROUP ROPES & GRAY LLP ONE INTERNATIONAL PLACE BOSTON, MA 02110-2624			MICHALSKI, JUSTIN I	
			ART UNIT	PAPER NUMBER
			2644	

DATE MAILED: 12/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/839,485	LAVOIE ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Justin Michalski	2644	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 25 May 2005.  
 2a) This action is FINAL.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-7,9-11,13-17 and 19-26 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-7,9-11,13-17 and 19-26 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____. | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
|   | 6) <input type="checkbox"/> Other: _____.                                   |

## DETAILED ACTION

### ***Specification***

1. The amendment filed 7 June 2005 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: paragraph between page 22, line 17, and page 23, line 12. "Only a selective region of the impulse response is modeled. Selecting the region after the TOF and before the first reflection will isolate the portion of the response known as the anechoic response, which is the direct path between the monitor and the microphone". On page 8 of the remarks filed 7 June 2005 the applicants state that supporting language for the amendment can be found in the provisional application serial number 60/198,927 on page 101, lines 2-4. The Office has reviewed page 101 of the provisional application (see attached) and no supporting language for the amendment to the specification could be found. Applicant is required to cancel the new matter in the reply to this Office Action.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 1 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not

Art Unit: 2644

described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 1 establishes the limitation "...isolating a portion of the response signal between a time of flight signal and the reflected signal...". Support can only be found in currently amended specification in the paragraph between page 22, line 17, and page 23, line 12 which is objected due to unsupported new matter.

4. Claim 1 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 1 includes the limitation "correlating the isolated portion of the electric response signal with the electric calibration signal to compute filter coefficients". Page 10 of the specification discloses correlating samples from microphone 11 with the MLS signal but no support can be found for correlating the isolated portion of the electric response signal with the electric calibration signal to compute filter coefficients.

5. Claim 4 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession

Art Unit: 2644

of the claimed invention. Claim 4 discloses “analyzing a correlation between the impulse response and the MLS signal”. Support for this limitation can not be found in the specification. Page 10, lines 13-19 of the specification discloses correlation (at correlator 24) of the MLS signal and samples received from the microphone 11 and preamplifier 23. There is no disclosure of correlation between an impulse response and the MLS signal. In fact, page 10 line 20 through page 11 line 2 disclose that the output of correlator 24 is supplied to impulse modeler 25 to derive the impulse response for a channel in the surround sound system. Therefore, the correlator cannot correlate the impulse response and the MLS signal since the impulse response is derived from the correlator output.

6. Claim 19 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 4 discloses “wherein the processor detects in the received electric signal a reflected signal and correlates a portion of the response signal between a time of flight signal and the reflected signal with the test signal to compute filter coefficients”. Support for this limitation can not be found in the specification. Page 10, lines 13-19 of the specification discloses correlation (at correlator 24) of the MLS signal (i.e. test signal) and samples received from the microphone 11 and preamplifier 23. There is no disclosure of correlation of a portion of

1) the response signal between a time of flight signal and the reflected signal and 2) the MLS signal (i.e. test signal). In fact, page 10 line 20 through page 11 line 2 disclose that the output of correlator 24 is supplied to impulse modeler 25 to derive the impulse response for a channel in the surround sound system from which the time of flight is determined. Therefore, the correlator cannot correlate a portion of 1) the response signal between a time of flight signal and the reflected signal and 2) the MLS signal (i.e. test signal) since the impulse response for determining the time of flight is derived from the correlator output.

Dependent Claims 2, 3, 5, 6, 7, 9, and 20-26 are rejected as being dependent on claims 1, 4, and 19.

#### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 10, 11, and 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eatwell et al. (Hereinafter "Eatwell") (US Patent 5,481,615) in view of Zacharov et al. (Hereinafter "Zacharov") (US Patent 6,639,989).

Regarding Claim 10, Eatwell discloses an auto-calibration surround sound (ACSS) system (Figure 3), comprising: an electro-acoustic converter (actuator 7)

disposed in an audio channel and adapted to emit a sound signal in response to an electric input signal (signal 1), a processor (equalization filter 2 and adaption 12) generating a test signal (signal 17) and supplying the test signal as the electric input signal to the electro-acoustic converter (7), and an acousto-electric converter (microphone 8) receiving the sound signal in a listening environment and supplying a received electric signal (signal 9) to the processor, a coefficient extractor which generates filter coefficients of a corrective filter (adaption 12) wherein the processor correlates the received electric signals and optimizes the corrective filter by selecting those generated filter coefficients that minimize an error term between a desired filter response of the corrective filter that produces a whitened audio response of the audio channel in the listening environment and the filter response produced with the generated filter coefficients (Eatwell discloses adjusting the filter characteristics, Col. 4, lines 47-48). Eatwell does not disclose the use of a maximum length sequence (MLS) signal for the test signal or producing an impulse response of the received sound. Zacharov discloses a calibration system for a multichannel surround sound system (Col. 2, lines 41-47). Zacharov further discloses the use of a test signal consisting of a maximum-length sequence (Col. 2, lines 41-47). Zacharov teaches that MLS signals are deterministic and can be easily generated and repeated exactly. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a MLS test signal in order to produce a signal that is easily generated and can be repeated exactly to obtain a high quality audio calibration.

Regarding Claim 11, Eatwell further discloses a least-mean-square error fit (Eatwell discloses adaptive filter using least mean square method) (Col. 4, lines 40-45) between a desired whitened response (signal 1) and the filter response produced with the generated filter coefficients (signal 5). Zacharov further discloses that the MLS signal is used to calculate the impulse response of the environment (Col. 2, lines 38-47).

Regarding Claim 13, Eatwell further discloses the corrective filter (filter 2) is located in an audio signal path between an audio signal line input (1) and the electro-acoustic converter (actuator 7) and cascaded with the audio signal line input (signal 1).

Regarding Claim 14, it is inherent that a corrective filter will process a signal.

Regarding Claim 15, Eatwell further discloses the processor is a digital signal processor (Eatwell discloses that adaptive equalization filter can be implemented in digital form, Col. 4, lines 26-30).

Regarding Claim 16, Eatwell further discloses including an analog-to-digital converter that converts an analog audio line input and the electric signal supplied by the acousto-electric converter into temporal digital signals (Eatwell discloses an analog to digital converter may be used to convert sensor signal 9 to a digital signal (Col. 4, lines 30-34) and both the desired signal (i.e. line input) and the sensor signal may be calculated from digital signal (Col. 4, lines 36-38).

Regarding Claim 17, Eatwell further discloses a digital-to-analog converter that converts digital output signals from the DSP to an analog audio line output for driving the electro-acoustic converter (Col. 4, lines 27-30).

***Conclusion***

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Justin Michalski whose telephone number is (571)272-7524. The examiner can normally be reached on M-F 7-3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivian Chin can be reached on (571)272-7848. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2644

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JIM



December 20, 2005



HUYEN LE  
PRIMARY EXAMINER

less the system becomes minimum phase. The issue that remains is how to identify each of the critical points in the impulse response, see [Hayser, R.C.] and [Schroder].

### 7.3 Use of Analytic Functions in Correlations

As it stands right now, the crosscorrelation is performed between the transmitted MLS and the received signal. However, there is another signal which could be used in place of the directly received signal. The use of *Analytic Functions* is widely used in communications type problems as well as in many ultrasound applications [churchill],[haykin],[paper from peterson]. There is a substantial gain in resolution of the signal that is to be had by using the analytic signal, if it exists. This is an area which should be investigated more since any increase in system performance is a benefit.

### 7.4 Generating Filter Coefficients

Generating the coefficients for the matched filter is presently done by minimizing the summed square error terms. Using the Levinson-Durbin algorithm, the LMS optimized matched filter coefficients are generated. There are other methods that can be used to generate the filter tap coefficient, each with its own set of merits. The reason that minimizing the LMS was selected is that under the previously stated assumption of a minimum phase system, it could provide good error performance with great efficiency. The down side of using the LMS error as a figure of merit, is that as the system becomes one of nonminimum phase, the error performance decreases.

Extending the assumption of a minimum phase listening environment to include a non-minimum phase component is discussed in a paper by [neely]. A proposed method for whitening such a mixed phase system uses the notion of two compensation filters, and is called M.I.N.T [Miyosi]. The proposition is that since the listening environment is essentially a multichannel system, why not model it as such and use several filters for the whitening